



The magnetic Sun

Study time: 20 minutes

Summary

In this activity you will view a video clip about solar granulation and magnetic features of the Sun such as sunspots and solar flares. The sequence shows observations that illustrate how these phenomena evolve with time. This sequence is best watched after you have read Section 2.3 of *An Introduction to the Sun and Stars*.

Learning outcomes

- Recognize the observed characteristics of the following solar phenomena: solar granulation; sunspots; solar flares; filaments.
- Appreciate that sunspots and solar flares are primarily magnetic phenomena.

The activity

- To find the video clip for this activity, start the S282 Multimedia guide and then click on The magnetic Sun in the folder called 'The Sun' in the left-hand panel.
- Press the **Start** button to run the video sequence.

Note that at time code 07:41 a schematic diagram of a flare appears on screen that the narration says is reproduced in these notes. This diagram is not given here, but you should instead look at the very similar diagram in Figure 2.25 of *An Introduction to the Sun and Stars*.

After you have watched the video clip, answer the following question.

Question 1

Watch the final 15 seconds of the video clip again (starting from the on-screen clock reading of 08:31). As you do so, note the clock readings when the following solar phenomena are visible:

- sunspots
 - flare
 - filaments.
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Notes

The video sequence can be summarized as follows (the timings are those that appear on screen as the various topics begin).

00:00 You first saw the features that are *not* due to magnetic activity – granulation due to convection cells, each some 1000 km across covering the photosphere. The granulation also participates in larger-scale ordered motion. This is called supergranulation.

00:56 You then saw features that *are* due to magnetic activity, including sunspots, prominences and flares.

01:32 Sunspots, and the sunspot cycle, were explored in some detail, including the dynamic interactions with the plasma flow and magnetic fields. The sunspot cycle has an 11-year period in terms of numbers of sunspots and their position on the photosphere, but a 22-year cycle if magnetic polarity is taken into account.

05:50 Flares – regions showing a sudden release of energy across the electromagnetic spectrum – were shown to be associated with sunspots, and characterized by particles flowing down magnetic arches towards the photosphere.

07:41 See the comment at the start of these notes about the schematic diagram of the flare.

08:20 You saw a sequence of observations showing various solar phenomena.

08:31 The narrator asks you to identify solar phenomena that are visible (Question 1).

08:45 Sequence ends.

Video credits

Narrator – Alan Cooper (The Open University)

Producer – Tony Jolly (BBC)

Answer to Question 1

Here are the clock readings for the solar phenomena you were asked to identify:

Phenomenon	Clock reading (at first appearance of phenomenon)
sunspots	08:31
flare	08:33
filaments	08:39